"Dedicated to Public Service"

# THE RADIATOR

Chico Golden Empire Amateur Radio Society, Inc.

SPECIAL SERVICE CLUB

W6RHC
IRLP #8170

www.gearsw6rhc.org

P.O.Box 202 Chico, CA 95927

| April 2022 Newsletter | GEARS Founded August 13, 1939 |
|---|---|

From the President……


The year is moving forward with great haste. We are already in April. April showers bring May flowers and all that stuff, but the flowers are already out just about everywhere. The Dogwood are gracing us with their beauty, my neighbor Bill has a lovely lilac tree that hangs into my yard, it is sharing with us it's beauty both in color and aroma, not to overlook the Daffodils and Lilies that are a lovely reminder SPRING is approaching. The days are getting longer and the weather is wonderful, I just love it. As I get older it seems I gain more and more appreciation of the natural beauty all around.

GEARS activities are HAPPENING! The auction is approaching, Field Day is not far behind and radio support for the Wildflower Ride is in the mix. The Wildflower Ride is April 24th; if you are interested in helping out, please contact Kathy Favor, K6FAV and volunteer to support the ride.

I want to thank Kent Hastings WA6ZFY, GEARS Vice President and the GEARS Board of Directors for keeping things going and moving forward. It seems Jim Matthews, K6EST is always out there picking up loose ends and keeping things from "falling through the cracks," for me and the club, thank you.

Happy April to you all.

'73
Paul Stewart N6PAS
n6pas1@gmail.com

Join GEARS on Facebook www.facebook.com For timely news and additional information.

**April 2022 Calendar**

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| 3<br>8pm OARS Net<br>2pm VEC Testing | 4<br>7pm GARS Net<br>8pm ARES Net | 5<br>7pm PARS Net<br>7:30pm GEARS Net | 6 | 7<br>7:30pm Simplex Net | 8<br>7pm OARS meeting<br>7pm GARS meeting | 9<br>9am Chico Breakfast |
| 10<br>8pm OARS Net | 11<br>7pm GARS Net<br>8pm ARES Net | 12<br>7pm PARS Net<br>7:30pm GEARS Net | 13 | 14<br>7:30pm Simplex Net | 15<br>7pm GEARS Meeting | 16 |
| 17<br>8pm OARS Net | 18<br>7pm GARS Net<br>8pm ARES Net | 19<br>7pm PARS Net<br>7:30pm GEARS Net | 20 | 21<br>7:30pm Simplex Net | 22 | 23 |
| 24<br>8pm OARS Net | 25<br>7pm GARS Net<br>8pm ARES Net | 26<br>7pm PARS Net<br>7:30pm GEARS Net | 27 | 28<br>7:30pm Simplex Net | 29 | 30<br>9am OARS Breakfast |

**VEC Testing,** FCC License Exam available by appointment. For information or registration call Tom Rider, W6JS 530-514-9211
**Chico Breakfast** 2nd Saturday 9am Farmers Skillet Cohasset Rd, Chico
**GEARS** Board Meeting 1st Monday 7pm by zoom.
**PARS Meeting** 2nd Thursday 6:30pm, doors open 6pm Old Magalia Community Resource Center
**OARS Meeting** Second Friday of the month, St. Pauls Episcopal Church Hall, Oroville.
**GARS Meeting** Second Friday of the month, Lutheran Church Hall, Artois.
**Butte ARES Meeting** 3rd Tuesday, TBD Contact Dale Anderson, KK6EVX 826-3461 for more information.
**GEARS Meeting,** 3rd Friday of the month, Eyeball QSO 6pm, meeting at 7:00 pm. Scuba Hut, Chico
**OARS Breakfast** 4th Saturday of the month, at Cornucopia of Oroville.

**NETS:**
OARS Club Net Sunday 8pm 146.655 Mhz - PL 136.5
GARS Club Net Monday,7:00 pm 147.105 MHz + PL 110.09, secondary: 146.850 MHz-PL 110.9
Butte ARES Net Mondays 8pm 145.290 MHz - PL 110.9
Yuba Sutter Club Net Monday 7pm 146.085 MHz + PL 127.3
GEARS Club Net Tuesdays 7:30 PM 146.850 MHz - PL 110.9
PARS Club Net Tuesday 7pm 145.290 - PL 110.9
Simplex Net Thursday 7:30 p.m. 146.52 no tone
Yuba Sutter ARES Net Thursdays 7pm 146.085 MHz + PL 127.3
Sacramento Valley Traffic Net Nightly 9:00 PM 146.850 MHz - PL 110.9

## GEARS Century Members

Dale Anderson, Kathy & Michael Favor
Kent Hastings, Bennett Laskey, Jim Van Sickle
*We thank these members for their extra support.*

## GEARS NEWS

Due to changes with the Sheriff Search and Rescue Training, we will no longer have access to the SARS Building. We are looking for a new location for our meetings and VEC Testing. For the time being we will be meeting at Scuba Hut, 2725 CA-32 Nord Ave, Chico, CA 95973.

If you know of another location in Chico where we could meet, please contact Paul Stewart N6PAS n6pas1@gmail.com

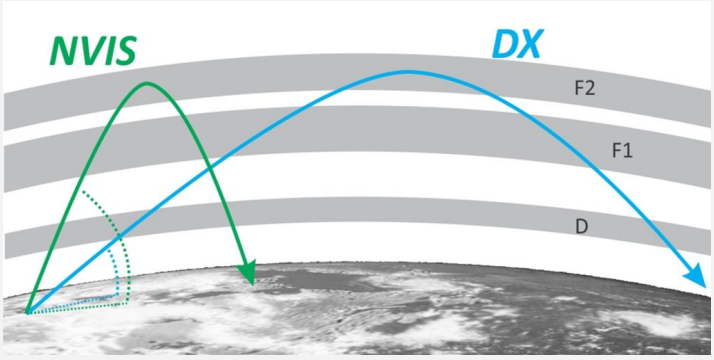
## New License Fees

New Amateur Radio License Applications Fee To Become Effective April 19, 2022. It will cost $35 for a new or to renew your license. The ARRL Youth Licensing Grant Program to cover a one-time $35 application fee for license candidates younger than 18 years old. Read more at http://www.arrl.org/.../new-amateur-radio-license....

Further information and instructions about the FCC Application Fee are available from the ARRL VEC at www.arrl.org/fcc-application-fee.

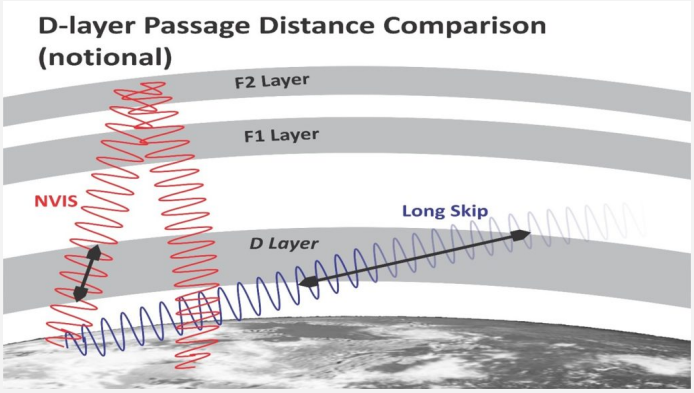
## What is NVIS?

By Elizabeth Klinc, KE8FMJ




NVIS stands for Near-Vertical Incidence Skywave. It is used for local-to-medium distances on HF. This is the opposite of DX, which is meant for long distances. The radio waves from NVIS travel near-vertically upwards into the ionosphere, where they are refracted back down. It fills the gap between line-of-sight and the longer distance skip-type communications that are normally used at HF. The most reliable frequencies for NVIS communications are between 1.8 MHz and 8 MHz. Above 8 MHz, the probability of success begins to decrease, dropping to near zero at 30 MHz.

With DX, or ordinary propagation, the signal must take off at a low angle—30 degrees or less—so it can travel the maximum distance before it first touches the ionosphere. This causes a long gap before the signal returns to Earth. The area between this and the end of the ground wave is called the Skip or Dead Zone.

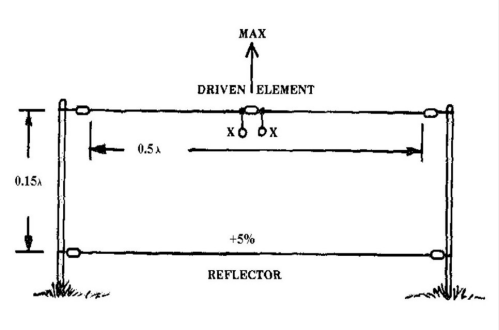



With NVIS propagation, the signal must take off at a high angle—about 60 to 90 degrees—from the antenna. This causes the signal to practically go straight up and then return at a similar angle. This is the way to reach the Skip or Dead Zone. With this method, it is important to minimize ground wave so as not to interfere with the returning skywave. It is important to remember too high of a frequency will pass through the ionosphere and not return to Earth.

The ionosphere consists of D, E, F1, and F2 layers. The D layer, and to a lesser extent the E layer, absorb and attenuate the signal. The best signal returns are from the F2 layer.

So what kind of antenna to use? Remember that a high angle of 60 to 90 degrees is needed. Verticals do not work for this. They have a predominantly low take-off angle. A half-wave dipole also produces low angle radiation.

However, when a half-wave dipole is lowered to a quarter wavelength above ground or below, high angle radiation is produced. Be careful not to go too low to avoid earth loss.




## CobWeb Aerial

By Charlie M0PZT

I decided that I wanted to build a CobWeb after looking at compact multi-band HF aerials. The CobWeb ticked the most boxes for me due to its 5-band capabilities, reasonable size and not too tricky to build – As it's an omni-directional antenna, I wouldn't need a rotator.

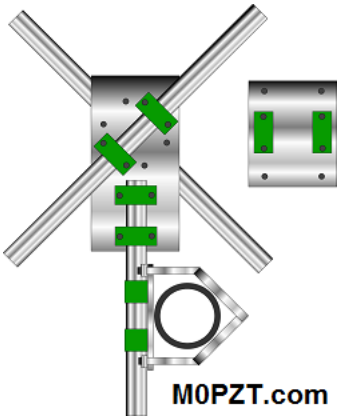
Much of the inspiration (not to mention technical details) was obtained from G3TXQ's CobWeb webpage although there are many sites that also detail the aerial's features and construction.

The antenna complimented my "low-band" horizontal dipole nicely and gave me the most useful HF bands (20-10m) without needing an ATU. Note the spelling of CobWebb vs CobWeb – The original G3TPW was designed by Steve Webb, hence the spelling. As this is the G3TXQ variant, I refer to mine from now on as a "CobWeb".

The CobWeb offers the following features :

- 20m, 17m, 15m, 12m, 10m operation
- Compact and easy to handle – Around 8ft square
- Doesn't have to be too high – Reasonable performance at 10ft, with 20ft being the ideal
- Can be made with either figure-of-8 speaker wire (folded-dipole) or single-wires and 1:4 balun (for impedance matching)
- Can be constructed with PVC tube or fiberglass poles
- Possibility of being used portable if built right – perhaps with a tripod speaker stand?
- Depending upon your circumstances, you may find this aerial visually more appealing that a 5-band flat-top fan dipole.

The CobWeb can be a great /P aerial, too. A drive-over base and some swaged poles make a nice setup for operating from the car.




Parts required :

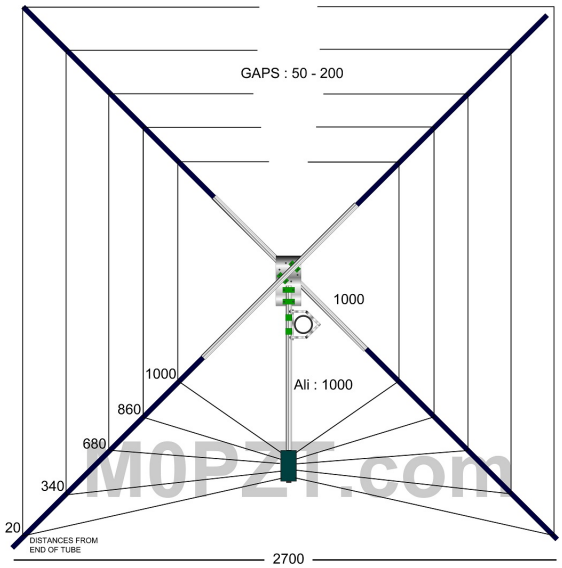
- Aluminum Plate : 200x100mm *
- Aluminum Plate : 150x100mm *
- 3x 1″ 16swg Aluminium Tube, 1m length *
- You can use fiberglass throughout, if the wall-thickness is sufficient
- 2x 20mm PVC Conduit, 3m length – fine for prototype, but fiberglass is better!
- 8x 1″ Stauff Element Claps *
- 2x V-bolts *
- 1.6mm (or whatever you have) Wire – total usage is about 38m.
- 2x FT140-61 (or FT240-61 for QRO) Ferrite toroids – from Ham Goodies
- 4x 600mm of RG316 Coax (Ham Goodies), or, for 100w MAX: RG174 will be fine
- 1x Waterproof Enclosure (min size: 120x85x55mm)
- Selection of nuts/bolts – ensure they are stainless-steel!
- * Metalwork Options
- The mounting plate and fixings can be purchased from John G4ZTR's Aerial Parts of Colchester

As this version does not use folded-dipole elements, we need to compensate for the impedance of the wires when bent into a square. A 1:4 Current Balun is required. Should you wish to wind your own, Ham Goodies sell the FT140-61 toroids and RG316 coax. A complete balun solution is also available in "standard" (as shown here) and "QRO" (using the larger FT240-61 ferrites): Fully assembled, soldered, boxed and sealed. See the CobWeb Balun box on the Ham Goodies site. With John's metalwork and the balun you just need to add a set of fiberglass spreaders and some dipole wires.

The main part of the CobWeb is the mounting-plate that holds the crossover poles and boom arm.

After looking at the various examples online, I opted to re-engineer an existing design – Some of which used either plastic PVC conduit clamps or small U-bolts – I opted to use the rugged Stauff element clamps which are able to support the spreaders securely without damaging or stressing them.

The mounting arrangement consists of 2 plates – The 1st holding the main crossover poles (1 on top, 1 underneath) and the boom, the 2nd supporting the boom and fixing to a mast. This design permits the CobWeb to be mounted at any height up a typical 1.5-2″ supporting pole.




Inside the box, I used 2 strips of copper-clad board as a "bus-bar" through each screw – the coax from the balun was then soldered at a convenient point.

The spreaders (which must be non-conductive) for this prototype were made up of 20mm PVC conduit. The overall diameter fits nicely inside the aluminium poles with a few turns of PVC tape either side of the fixing hole. Fibreglass is the more common material used for the CobWeb, but I am happy with the PVC tube although it did droop a bit after extensive exposure to sunlight – I advise the use of fibreglass tubing if you're going to install this as a permanent aerial.

There has been some discussion recently about the use of 1″ tubing and it affecting the aerial's performance – While it's good practice (and common-sense) to keep metal away from radiating wires, there has been no apparent change in VSWR or performance when building the aerial to the above specifications. You can use fibreglass tube all the way to the bracket, if you like – ensure that the wall-thickness is sufficent and use the Stauff clamps – they'll put less strain on the material.

The following details my own build and what worked for me – Each piece of PVC sticks out 140cm past the ali-tube, with 100mm inside the ali and held in place via a through-bolt. The dimensions shown on the plan below are all in mm. The dimensions shown next to each wire are the distances from the outer-end of the PVC tube. The 10m wire is therefore around 40mm from the ali-tube (and the 20m wire is only 20mm from the edges of each spreader). You can also see how I've threaded the wire through the PVC tube – just 2 small holes and the wire is threaded in+out which helps keep it tight.

When installing each set of wires for the first time – Secure them onto the PVC using velcro cable ties. This means that you can move the position of them quite easily if you need to make changes.

There are 2 ways to make a CobWeb antenna: The original G3TPW CobWebb (note spelling) using speaker-wire forming folded dipoles, or the G3TXQ CobWeb using single-core and a 1:4 balun. I have opted for the G3TXQ version in this case. Typically, when forming a dipole into a square shape, the impedance presented drops to around 12.5ohms – Hence the use of a 1:4 Guanella current balun which is mounted inside the terminal box – This, as you've probably guessed, brings things up to around 50ohms as expected by your transceiver. As it's a Current Balun, no additional choking should be required on the coaxial cable (this is NOT an MFJ design).

You will need 2x 600mm lengths of RG316 (or RG174 for 100w max) which can be linked via a series of short lengths of heat-shrink tubing. You simply wind a total of 8-turns: 4 and then a cross-over and finally another 4. The ends are solded inner-to-inner and outer-to-outer. Make 2 of these and link them together via 2 cable-ties – The ends of both are then soldered in the following way: End 1 is inner-to-inner and outer-to-outer (ie: parallel). End 2 is inner-to-outer which leaves you with an inner and outer. End 2 is the one you connect to the SO-239 socket.

Tuning this type of CobWeb is simpler than finding the "sweet-spot" tapping-point on the speaker-wire – but people generally stick to the "traditional" design. The only drawback with the G3TXQ single-wire version is having to make-up the 1:4 balun!

Still, it's far better than messing-up lengths of speaker-wire with incorrect tapping points. YMMV. Thanks to my earlier test (13.2MHz resonance) I knew that the current size of the beast was a tad on the large side, so I reduced it by 10cm. This makes mine 270cm square. The height whilst on-test was 10ft, about 4ft under my dipole and the comparison test was quite favourable.

I assembled the antenna with it mounted atop a 5ft pole – when adding a further 5ft pole, the resonance altered – So be prepared to either work at a higher level or you'll have to raise/lower the aerial between adjustments. I advise you to fit all 5 dipoles and then tune 20m first, then move up, ending with 10m. You'll find that, if you only fit 1 band, the tuning may alter as you add the other wires.

You'll find that, particularly on 15m+10m – It'll need some help from an ATU if you plan on running CW/Datamodes as well as voice. Expect about 250KHz of 3:1 swing at best. Here's the finished article – Due to the angle of the photo, the feed-point looks like it's raised, but it isn't! After extensive testing, I have came to the conclusion that there is little difference between using black or white PVC tube (the Wickes brand, at least) – Therefore, you can choose the best colour to suit your QTH. I chose black as most of my CobWeb would be sitting just about the roof-tiles. For a long-term solution, fiberglass tubing is advised.

**GEARS Officers:**

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